

the reproduction of those Freshwater Algæ in which zoospores form the commonest means of propagation. From the recognition of the contemporaneous existence of zoospores or gonidia with sexual organs of reproduction in *Vaucheria*, he is led to conjecture the existence of a similar condition in other genera. In *Achlya*, both zoospores and resting spores are known, and he suspects that the slender branches found upon those filaments of *Achlya* which bear sporanges, will prove to be antheridia. In *Edogonium*, the membrane of the sporangial-cell bursts before the formation of the spore-coat, which admits of the possibility of a penetration of spermatozooids. In *Bulbochæte*, a fissure is also met with. Now in these genera, besides resting-spores and ordinary zoospores, we find exceedingly small bodies, resembling the zoospores in their structure, called by A. Braun *microgonidia*. These are developed in cells smaller, and differing in character from the ordinary vegetative cells. They germinate, but produce small bodies, composed only of one or two cells, which, it is remarkable, are always found attached upon the sporangia, or near them. Here they dehisce and discharge their contents. Although no trace of spermatozooids has been perceived in them, this discharge of the contents near the opening of the sporangial membrane tends to the conjecture that they exercise an impregnating influence on the resting-spore. If this be the case, we should have the curious phenomenon of the male structure being developed as a special separate body, a kind of prothallium. With the above peculiarities is associated in *Bulbochæte* a curious mode of germination of the resting-spores. Examples of these kept through the winter produced, not a new filament, but four ciliated zoospores, which escaped, came to rest, germinated, and then produced new filaments. A similar phenomenon was observed in the case of the resting-spores of *Coleochæte*.

The paper concludes by a summing up of the results, which will be unnecessary after this brief abstract.

BIBLIOGRAPHICAL NOTICES.

A History of the British Marine Testaceous Mollusca, distributed in their Natural Order. By WILLIAM CLARK. London: Van Voorst, 1855.

THE study of malacology, or of the true natural history of the Mollusca, has sprung up almost entirely within the last half-century. Up to this period the attention of zoologists in this department was almost exclusively directed to the shells of these animals, the only part which admits of being easily preserved in the cabinet or transported from a distance, and the structure of the creatures producing

them was entirely neglected. This province of zoology was therefore appropriately denominated Conchology.

At the end of the last and the beginning of the present century, however, the first step towards a better state of things was made by Adanson, Poli and Cuvier; the latter, about this period, published anatomical descriptions of twenty or thirty species of Mollusca, belonging to various families, principally of the Gasteropoda. It was soon found that the study of the animals would introduce many new elements into the classification of the Mollusca, and Cuvier, Lamarck and De Blainville each published systematic works, in which the characters of the larger groups were derived as far as possible from the structure of the few molluscous animals with which the authors were then acquainted, whilst those of the minor groups were taken almost entirely from the shells. Of these systems, that of Lamarck was the one most generally adopted, probably from its being accompanied by descriptions of a large number of species, and it is still in use with but little modification by many conchologists, especially in France. For many years, in fact, the Lamarckian system was followed almost exclusively, and the only zoologists who attempted the introduction of any new views into the classification of the Mollusca were Dr. Gray and Mr. Swainson, the former in a slight sketch published in the *Synopsis of the British Museum* for 1838, 1841 and 1842, the latter in his somewhat imaginative work which forms part of Lardner's '*Cyclopædia*.'

But during this period of comparative stagnation in the progress of systematic malacology, numerous naturalists were engaged in collecting observations which were one day to change the whole face of this department of zoology. In our own country, Montagu, Johnston, Alder and Hancock, and the author of the work now under consideration, published descriptions of many of the animals of the British Mollusca; a few continental naturalists performed the same good office for the species inhabiting the seas bordering their countries, and the excellent naturalists attached to the numerous French voyages of discovery contributed a mass of valuable observations upon exotic species, illustrated in most cases with excellent figures.

The numerous and valuable observations contributed by these authors to the natural history of the Mollusca soon introduced a great change into the systematic arrangement of these animals, in which, notwithstanding the efforts of Cuvier and others already referred to, the conchological element still greatly predominated. It was found that shells positively identical in character might serve as the habitation of animals presenting such great differences both in their form and their anatomical construction, that they required to be placed not only in different genera, but even in genera which in a philosophical classification must be separated from each other by a wide interval;—thus, in 1847, Dr. Gray published a list of about thirty genera of Gasteropodous Mollusca, which it is impossible to distinguish from the examination of the shell alone, whilst the animals present well-marked differences, and there is no doubt that subsequent observations will add considerably to this list.

The perception of these facts led zoologists to direct their attention more especially to the structure of the molluscous animal, in forming their classifications, and there can be no doubt that this has been attended with most beneficial results; but many of the partisans of the new system, on their emancipation from the fetters of a pure conchology, rushed into the very opposite extreme, regarding the structure of the hard parts as of no value even in the discrimination of the smaller groups. With the usual zeal of reformers, they required that every trace of their former faith should be destroyed; they tore down the ancient images from the niches in which they had for years commanded respect, but unfortunately in too many cases only to set up new ones in their deserted places.

In this number we must place Mr. Clark, the author of the work whose title stands at the head of this notice. For Mr. Clark the structure of the shell is of little or no value; for although he tells us (p. 239) that he considers "the shell-coverings of the Mollusca as good and useful aids, in strict subservience to the malacology of the animal, and as consequential specialties emanating from the vital organs," he appears generally in the course of his work entirely to disregard the characters derivable from the shell and operculum. It appears to us that Mr. Clark, like many other authors, lays too much stress upon the instances already referred to in which different animals inhabit shells of the same construction. We agree with him in regarding the "shell-coverings of the Mollusca as specialties emanating from the vital organs," and therefore think that the characters derived from the structure of the shell and operculum should certainly be regarded as of some value in the arrangement of the Mollusca. Mr. Clark, however, appears to entertain a different opinion, and applies the pruning-knife most unsparingly to all groups which he considers to have a purely conchological origin. As an instance we may refer to his genus *Murex*, in which he includes the whole of the species belonging to the genera *Murex* and *Buccinum* of Linnaeus, which are considered by most authors as forming numerous genera, and by many as constituting at least two families.

Mr. Clark's primary principle of classification is derived from the sexual relations of the animals, which he describes as *Hermaphrodita sine congressu*, *Hermaphrodita congressu*, and *Bisexual*; by the latter term we must understand *unisexual*. This principle certainly has not the merit of novelty, which the author appears to claim for it, for his terms as applied to the Gasteropodous Mollusca are exactly identical with the *Paracephalophora hermaphrodita, monoica* and *dioica* of De Blainville, and as both the groups of Acephala are defined as *Hermaphrodita sine concubitu*, it is hard to say what is the advantage of this sexual system. Its disadvantages however are more apparent, for when Mr. Clark tells us that the Acephala are hermaphrodite animals, we must regard this statement as a simple assumption in the case of the Palliobranchiata, whilst in regard to the Lamellibranchiata, it is distinctly at variance with generally received views; and we look in vain in our author's pages for a satisfactory reason for adopting his opinion,—his anatomy of *Pholas dac-*

tylus, to which he refers the reader for this purpose, being anything rather than conclusive.

We have already remarked, that the primary groups formed by the author amongst the Gasteropodous Mollusca are identical in their signification with those of De Blainville. This identity also prevails to so great an extent in the contents of these divisions, that we are involuntarily led to believe that Mr. Clark's system is really founded upon that of the French author. Thus, his *Hermaphrodita sine congressu* are the same as the *Hermaphrodita* of De Blainville, with the mere addition of the *Chitonidæ*, a group which De Blainville placed amongst his Malentozoaria with the Cirrhopoda, considering them to form a connecting link with the Articulated type of animals; and this agreement between the two authors is the more remarkable, as it appears exceedingly doubtful whether the phænomenon, from the supposed occurrence of which this group is separated from the other Gasteropoda, ever takes place in this class of animals.

The other two groups, the Monœcious and Diœcious Mollusca, exhibit a similar resemblance to the corresponding divisions in De Blainville's classification, the only difference being that Mr. Clark transfers the *Trochidæ* (with *Valvata*) and *Vermetidæ* (including *Turritella*) to the Hermaphrodite section. The grounds urged by Mr. Clark in favour of this change, which is in direct opposition to the views which have prevailed ever since malacology was first studied, are by no means satisfactory, and he himself is forced to admit that they are mere *conjectures*,—an admission which, it appears to us, must greatly detract from any value which might otherwise attach to this system. In both these groups, his opinion that the animals are monœcious, *with congression*, is founded upon the circumstance that he has been unable to discover the male organs, —certainly rather a curious proof of hermaphroditism*. Another result of this adherence to an artificial system is, that the Pulmoniferous Gasteropoda occur in two of the primary divisions,—the *Helicidæ* and their inoperculated allies being placed amongst the *Hermaphrodita congressu*, and the *Cyclostomatidæ* amongst the *bi-sexual* (unisexual) species, under the denomination of *Gasteropoda Pectinibranchiata*. Under all these circumstances, we have little expectation that the sexual system as put forward by Mr. Clark will ever find much favour in the eyes of malacologists,—and we must regret that an observer of his reputation should have lent the sanction of his name to an arrangement so untenable.

It is not, however, upon its systematic arrangement that the value of the present contribution to malacological knowledge must depend, although the author appears to attach no small importance to it; the work is chiefly interesting from its containing original observations upon the structure and habits of a very great proportion of the Testaceous Mollusca inhabiting the seas which surround these Islands. We may remark in passing, that the work can scarcely be regarded

* Other authors who have particularly examined the animal of *Valvata*, referred by Mr. Clark to the *Trochidæ*, have proved it to be undoubtedly diœcious; and *Turritella* is in the same case.

as strictly fulfilling its title. Mr. Clark's observations have been made entirely at one point of our coast, and the work before us certainly proves how much may be done by an energetic observer in a single locality, but we think it would have been as well if a less pretentious title had been chosen;—"Observations on the Mollusca of the South Devonshire Coast," would have exactly expressed the contents of the book.

But even in its most limited sense, the appearance of this work must be regarded with great interest. For upwards of forty years the author has been engaged in studying the Mollusca; and many of the results of his observations have already been published either in scattered papers by himself, or as contributions to the works of others,—Messrs. Forbes and Hanley especially are largely indebted to him. In fact there can be little doubt that Mr. Clark has examined the animals of more species of the British Mollusca than any other malacologist, and many writers have expressed their regret that he did not bring out his observations in a collected form.

The present work may be regarded as a fulfilment of this wish. It contains, in addition to observations hitherto unpublished on numerous species of British Mollusca, reprints of the author's papers which have appeared in this Journal, and of the notes furnished by him to Professor Forbes for his classic work on the British Mollusca. Subsequent observations have proved many of the author's former statements to be incorrect, but it is much to be regretted that, instead of modifying his descriptions, he has printed them in their original form, followed by observations commencing with "Since the above was written," which not unfrequently contradict the statements made a page or two before. Mr. Clark tells us that he has done this with the express design of showing the process through which he has arrived at his present results, and there can be no doubt that it has the advantage of furnishing us with a test for the amount of reliance that may be placed on the author's observations; but it must be confessed that he would certainly have benefited his reputation as an observer, had he adopted some other course, for the numerous instances in which the author's first (published) impressions have required correction from his subsequent observations, render it by no means easy to place implicit faith in his statements when not confirmed by other observers. As an instance in point, we may refer to the author's descriptions of the branchiæ in *Pandora obtusa*. In a note communicated to the authors of the 'British Mollusca,' Mr. Clark described this animal as possessing "two palpi, one branchial lamina and (perhaps) an obsolete one, on each side the body;" at p. 151 of the present work, he tells us that he "can now say beyond dispute (!), and show the fact by preparations, that there are two palpi and two branchiæ on each side," whilst in the Appendix (p. 513) he returns to his original opinion. It is evident that little dependence can be placed on the observations of an author whose statements upon a simple matter of fact are so variable, and the instance here cited, although perhaps it may be rather an extreme case, is by no means without its parallels in other parts of the book, whilst *single* changes of opinion are not

unfrequent, and in these cases we have no means of knowing how soon Mr. Clark might recur to his original view.

We have already mentioned the ruthless manner in which Mr. Clark destroys those genera which he considers to repose on mere conchological grounds, and it was to be expected that the species would share the same fate; but we were hardly prepared for the wholesale destruction of names which have long figured in our lists, that we here meet with. There can be no doubt that science is burdened with an immense number of false species, arising in some cases from a zeal not sufficiently tempered with discretion, in others perhaps from less worthy motives; but we must confess, that when we see the number of species admitted by Forbes and Hanley, which have been suppressed by Mr. Clark, we cannot but suspect that his pruning has been carried on with rather too unsparing a hand.

Mr. Clark appears disposed to attach but little importance to the characters derived from the lingual dentition of the Mollusca, which have been regarded as of great value by Lovèn, Gray, Tröschel, and other zoologists. We fear that Mr. Clark is as much inclined to undervalue these characters, as some other authors are to over-rate them, for there can be no doubt that the disposition and form of the teeth on the lingual ribbon may afford excellent generic and even family characters, besides serving as important aids in the discrimination of nearly allied species.

Notwithstanding the defects pointed out in the foregoing remarks, we must regard Mr. Clark's book as one of the most important original contributions to British Malacology that has been made for some time. It contains a vast mass of valuable observations, including descriptions of the animals of more than 200 of our marine Testaceous Mollusca, with many interesting notices of their habits, and will, we have no doubt, contribute greatly to the advance of this branch of natural history.

*The Ferns of Great Britain. Illustrated by JOHN E. SOWERBY.
The Descriptions, Synonyms, &c. by C. JOHNSON. London, 1855.*

We have favourably noticed the first two Numbers of this book, which is now before us in its completed form. The more recently published parts appear to deserve the same meed of praise that we awarded to their predecessors. Indeed we trust that the name of Sowerby will long continue to be in itself a guarantee of the accuracy and beauty of such botanical plates as may bear it. Almost the only fault that we have to find with these drawings of ferns is that in some few cases the top of a frond alone is represented, and thus a satisfactory idea of the plant is not conveyed to the mind. It will perhaps be said that it was impossible in the space afforded by an octavo plate to give more complete representations of the larger plants; but when we see how Dr. Deakin has succeeded in doing so in his 'Ferns of Britain,' that excuse cannot be admitted. It is a singular, and, as it seems to us, unaccountable fact, that writers upon our ferns have by a sort of common consent neglected Dr. Deakin's volume. The only probable cause is, that the large work of which it originally formed a part has but slight value.